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turbinate involucre about 4 lines high, the multiserial closely imbricated bracts scarcely glandular, firm and chartaceous, with conspicuous short and appressed green tips ; purple rays narrow and numerous,  $\frac{1}{2}$  inch long.

Sandy fields of the Mesilla Valley, New Mexico, flowering in autumn. A distinct and beautiful species.

#### GAILLARDIA MULTICEPS.

Less than a foot high, the numerous very leafy stems from an apparently suffrutescent base, whitish and merely puberulent ; the numerous leaves also puberulent, rather fleshy and deeply impressed-punctate, the lowest narrowly oblanceolate, obtuse, the others linear, all entire, mostly 2 or 3 inches long ; peduncles short, slender ; bracts of the involucre ovate, caudate-acuminate ; rays yellow ; teeth of the disk-corolla short and obtuse ; ovaries very villous at base, more delicately pubescent above ; pappus of elongated lanceolate paleae, and a short awn, but this quite surpassing the disk-corolla.

South of Woodruff, Arizona. A member of the group to which belong *G. spathulata* and *G. PARRYI* (*i. e.*, *G. acaulis*, Gray, not Pursh).

### The North American Species of *Porella*.

BY MARSHALL A. HOWE.

The name *Porella* first appears in the *Historia Muscorum* of Dillenius,\* where it is applied to a genus of "Musci" from Pennsylvania, falling in his arrangement between *Lycopodium* and *Selaginoides*. In the generic characterization, the plant is described as bearing naked "antheraceous" capsules, without operculum or pedicel, dehiscing by several pores through the sides, and emitting a farinaceous powder. Following this is a diagnosis of the only species known to Dillenius, which we quote in the original, inasmuch as there is an opportunity for differences of opinion as to the exact translation in one or two particulars. His words are : "*Cui rami alterni, folia in nervo rigidiusculo alternatim opposita,*

\* *Historia Muscorum*, 459. *pl.* 68. 1741.

*obtusè pinnata, pellucida, viridia, altera parte convexa (vid. ram. e.) altera (vid. ramos reliquos) concava, qua parte capsulae ad pinnarum alas enascuntur parvae, oblongae, turgidae, exiguis aliquot ad basin squamis cinctae, tenui membrana constantes, quae luci obversae tres in singulo latere globulos ostentant, totidem foraminibus exilibus (duobus superius, reliquis per latera luscentibus) farinam fundentes; semina non comparent."*

He further remarks that the plant revives when immersed in water, but in the dry state is contracted and convolute, not showing its structure; that his figure was made too black in the course of the work [presumably by the engraver]; and that his specimen was sent from Pennsylvania by Jo. Bartram, who had indicated that it grew in humid places.

The principal figure given by Dillenius represents fairly well what we now know as *Porella pinnata*, though rather too stout and with leaves too closely set; smaller accessory figures show the leaves in natural size and the "farinaceous capsules" "*aucta magnitudine.*" The latter are ellipsoidal or obovoid in form and exhibit a few perforations.

The identity of the plant thus described and figured long remained a puzzle to botanical writers. In the *Species Plantarum* of Linnaeus it appears under the Musci between the genera *Lycopodium* and *Sphagnum*. Linnaeus here bestows the specific name *pinnata*, quotes the "*Porella pinnis obtusis*" of Dillenius, refers to description and figure in the *Historia Muscorum*, gives the habitat as Pennsylvania, and states that he has never seen the plant and that Kalm has been unable to find it on its native soil. Mr. James Dickson was the first to detect that the *Porella* of Dillenius belonged to the Jungermaniaceae, and it may be worth while to quote his narrative of the circumstances, especially as M. Le Jolis has somewhat recently\* given the impression that the discovery was wholly a chance affair and also that Dickson considered his *Jungermannia Porella* to be different from the *Porella* of Dillenius. Mr. Dickson's statements are as follows: †

"The genus *Porella*, first established by Dillenius and from

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\* Rev. Bryol. 19: 99. 1892.

† Trans. Linn. Soc. 3: 238. 1797.

him copied by Linnaeus, who never saw the plant, had long appeared to me to be very doubtful. I had, however, an opportunity, some time ago, of satisfying myself on this subject. I happened to receive some mosses as package to plants from America; and, upon examining them, found a *Jungermannia* and a *Splachnum* in fructification. I suspected the *Jungermannia* to be the same with the *Porella* of Dillenius; but this could not be ascertained without actually comparing the two specimens, which I had an opportunity of doing by the indulgence of Dr. Sibthorp, of Oxford, who permitted me to compare my mosses with Dillenius's original collection; and, upon the most careful examination, I found my *Jungermannia* to agree exactly with his *Porella*, but could find no fructification upon his specimens.

“As I have no doubt that my *Jungermannia* and his *Porella* are one and the same plant, I shall next endeavor to trace how Dillenius has fallen into this error; for the plant has exactly the habit of a *Jungermannia*. This was, probably, by receiving an imperfect specimen; as the vagina, when damaged either by the weather or by insects, after the tender flower had fallen off, would very much resemble the capsule which he has figured.

His figure of the plant is too much crowded with leaves; but in his original drawings, in the possession of Sir Joseph Banks, the leaves, so far as they are represented, are placed in the same manner as in the annexed figure. I shall now subjoin a description of it under the name of *Jungermannia porella*.”

The subjoined description and “annexed figure,” though somewhat incomplete according to modern standards, are very clearly based upon the plant of the eastern United States known as *Madotheca Porella* Nees, or, more recently, as *Porella pinnata* L.

In 1822 Dumortier established the genus *Madotheca*, based upon *Jungermannia platyphylla*, *J. thuja*, and *J. laevigata*. This name was taken up by Nees, who included in the genus the *Jungermannia Porella* of Dickson, and *Madotheca* came into general use as the appellation of this very natural generic group. Lindberg, in 1869, restored the Dillenian and Linnaean *Porella* and has been followed in this by Stephani (in some, at least, of his papers), Spruce, Massalongo, Underwood, Pearson, Evans, and others.

Schiffner,\* however, though rejecting *Madotheca*, considers *Porella* of Linnaeus a *nomen nudum* and adopts *Bellincinia*, Raddi (1818), reinstated by Otto Kuntze.

Lindberg supposed the "antheraceous capsules" to be the ♂ branches, but we are inclined to accept Dickson's explanation of the Dillenian error. We are assisted to this view by detecting in the larger figure† given by Dillenius what we believe to be two or three "antheraceous capsules," which have the general appearance of perianths, and also by the form of the detached and enlarged "capsules." M. Le Jolis has somewhat lately, in a second‡ paper on the nomenclature of the Hepaticae, expressed the opinion that the figure in the *Historia Muscorum* would apply to a *Selaginella* as well as to one of the Jungermaniaceae and that it is easier for him to believe that a *Madotheca* has by some chance been fastened to the sheet previously occupied by the enigmatical *Porella* than that Dillenius could have made such blunders in interpreting its morphology and affinities. Against this view may be urged a portion of the Dillenian description concerning which M. Le Jolis, in his two elaborate papers, is silent. The "*Aquae immersa planta reviviscit, sicca contracta et convoluta est, structuram non monstrans*" is not applicable to any *Selaginella* of the eastern United States, but does apply in a significant way to the hepatic in question, a form of which, with leaves strongly convolute and stem subcircinate in drying, was given the specific name *involuta* by Hampe. Moreover, Dickson's statement that in the "original drawings in the possession of Sir William Banks, the leaves, so far as they are represented, are placed in the same manner as in the annexed figure" should have much weight. Neither M. Le Jolis nor any one else will question the meaning of Dickson's "annexed figure."

The objection that *Porella* is a *nomen nudum* with Linnaeus would apply equally well to *Targionia hypophylla* or *Blasia pusilla*, so far as any "specific phrase" in the *Species Plantarum* is con-

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\*Engler & Prantl, *Nat. Pfl. Fam.* 1: Abt. 3, 115. 1895.

†We have had access to the Edinburgh reprint of the *Historia Muscorum* (1811) and the abridged edition of 1763. Of these, the figures in the 1763 edition, in the Columbia University copy, at least, are much the clearer.

‡Mém. Soc. nation. Sci. nat. et Math. Cherbourg, 29: 142-147. 1894.

cerned. These had the good fortune to have been more accurately figured and described by the predecessors whom he quotes, to be confessedly European, and to be understood by his contemporaries. But now that there is not the least manner of doubt as to what the *Porella* of Dillenius and Linnaeus was, there seems to be no good reason why it should not stand as the name of the genus. Professor Underwood has this last summer examined the specimen in question in the Dillenian Herbarium at Oxford and adds his testimony to that of others to the effect that the plant is congeneric with the traditional *Jungermannia platyphylla* of Linnaeus and clearly identical specifically with the common hepatic of the eastern United States, known to Nees and his followers as *Madotheca Porella*.

PORELLA L. Sp. Pl. 2: 1106. 1753. Ex. Dill. Hist. Musc. 459. *pl.* 68. 1741.

Plants large, dark-green to yellowish-brown, mostly somewhat regularly bi- or tri-pinnate, rarely subsimple; root-hairs in tufts at the base of the underleaves, usually sparingly developed. Leaves very deeply 2-parted; the dorsal lobes large, incubous, obliquely orbicular-ovate to oblong, entire, repand or somewhat dentate; ventral lobes much smaller than the dorsal, sometimes nearly discrete, ovate, lingulate, oblong, linear, or lanceolate, nearly parallel with the stem, entire or toothed, margins plane or revolute. Underleaves large, somewhat similar in form to the ventral lobes but usually broader, entire or dentate, often long decurrent on both sides. Antheridia spherical, very short-stalked, single in the axils of saccate, densely imbricate, nearly equally bilobed opposite leaves, these connate with the underleaves and forming short, lateral, oval to linear-oblong spikes. Archegonia generally numerous, terminal on very short (most rarely a little elongated) lateral branches. Perianth oval to obovate, flattened dorso-ventrally toward the mouth, from a more or less obconical base, much longer than the bracts, two-lipped after elevation of the capsule or sometimes irregularly torn, mouth ciliate, dentate, or subentire. Bracts usually a single pair with a single bracteole in addition to the underleaf at the base of the branch, the latter underleaf united with the subtending cauline leaf and functioning as its ventral lobe, or free, leaving the cauline leaf unlobed. Capsule spherical to oval-oblong, on a short seta, yellowish-brown, opening, usually not quite to the base, by four often irregularly split valves; cell-walls of the

valves mostly with irregular nodulose thickenings. Elaters commonly 2-(1-3-) spiral; spores several times broader, more or less echinulate.

**Key to the Species.**

- Stems subsimple or somewhat fasciculately branching, short, tumid; underleaves caudate-lacinulate at base. 8. *P. Bolanderi*.
- Stems more or less regularly 1-3-pinnate.
- Ventral lobes lingulate-oblong to linear-oblong, often somewhat falcate, closely appressed to stem or to dorsal lobes.
- Dorsal lobes and underleaves entire, length of ventral lobes  $\frac{1}{3}$ - $\frac{2}{5}$  the width of the dorsal. 1. *P. pinnata*.
- Dorsal lobes entire, underleaves ciliate-dentate at base, length of ventral lobes  $\frac{1}{2}$ - $\frac{2}{3}$  the width of the dorsal. 2. *P. Swartziana*.
- Leaves and underleaves repand-dentate. 3. *P. Wataugensis*.
- Ventral lobes broadly ovate to oblong.
- Usually shining.
- Ventral lobes more or less spurred outwardly at base, mostly linguiform or ovate-oblong, margins plane or lightly recurved. 7. *P. Roellii*.
- Ventral lobes regularly rounded outwardly at base, ovate, margin recurved. 6. *P. navicularis*.
- Usually dull.
- Rather flaccid, dorsal lobes subimbricate, ventral lobes long-decurrent, underleaves distant. 4. *P. rivularis*.
- Somewhat rigid, dorsal lobes rather densely imbricate, ventral lobes scarcely decurrent, underleaves approximate or subimbricate. 5. *P. platyphylla*.

I. PORELLA PINNATA L. Sp. Pl. 2 : 1106. 1753.

*Porella pinnis obtusis* Dill. Hist. Musc. 459. pl. 68. 1741.

*Jungermannia Porella* Dicks. Trans. Linn. Soc. 3 : 239. 1797.

*Jungermannia distans* Schwein. Spec. Fl. Am. Sept. Crypt. 9. 1821.

*Madotheca Porella* Nees, Naturgesch. Eur. Leberm. 3 : 201. p. p. 1838.

*Madotheca involuta* Hampe, Lehm. & Lindenb. in Lehm. Pugillus, 7 : 10. 1838.

*Madotheca Sullivantii* Aust. Bull. Torr. Bot. Club, 3 : 15. 1872.

Dark or yellowish-green, rarely whitish, dull: stems usually bipinnate, sometimes tripinnate or subdichotomous, 4-11 cm. long, rather laxly matted; branches obtuse, often subfastigiate: dorsal lobes of leaves somewhat distant, contiguous, or slightly

imbricate, horizontal, commonly deflexed or convolute in drying, oblong or ovate, rounded-obtuse, 1–2.5 mm.  $\times$  .65–1.7 mm., margins plane or the inferior slightly inflexed, entire, cells mostly with inconspicuous trigones; ventral lobes minute, closely appressed to the stem or to the dorsal lobes, very nearly or wholly discrete, linguulate-oblong or subfalcate, flat, with plane margins or slightly concave ventrally, obtuse, entire, not decurrent, .25–.68 mm.  $\times$  .1–.27 mm., length usually equaling  $\frac{1}{3}$ – $\frac{2}{5}$  the width of the dorsal lobe; underleaves subquadrate or short-oblong, distant, appressed, scarcely decurrent, equaling stem in width or occasionally twice as broad, margins plane, entire, apex rounded or rarely repand-emarginate: dioicous: perianth obovate-pyriform, 4–5 times the length of the bracts, slightly crenulate at mouth; lobes of bracts entire or subrepand-crenulate; bracteole oblong, entire; spores 30–42  $\mu$ , papillate; elaters 2-(3–4-) spiral, 170–240  $\mu \times$  9–14  $\mu$ .

EXSICC. Drumm. Musc. Am. (Southern States) 167, 168 (both as *Jungermannia platyphylla*).

Musc. Allegh. 264.

Hep. Bor-Am. 92, 92<sup>b</sup>, 93 (as *Madotheca involuta*), 94 (as *Madotheca Sullivantii*).

Hep. Am. 9, 115 (as *Porella involuta*), 175.

Can. Hep. 85.

On banks of shaded streams and on rocks and logs subject to overflow. Common in eastern North America from Nova Scotia to Louisiana. Owen Sound, Ontario (Macoun); Indiana (Underwood); Illinois (Schneck); Missouri (Demetrio); Arkansas (Coville); Cuba (Wright).

Type from Pennsylvania—in the Dillenian Herbarium at Oxford, England.

Usually collected in a sterile condition. *Jungermannia distans* Schwein. is a form with rather remote leaves, found especially in the Southern States. *Madotheca involuta* Hampe differs from the typical form only in unimportant and wholly inconstant characters. The leaves are a little more imbricate, their inferior margins sometimes more inflexed; in drying, the leaves are closely wrapped about the stem or decurved and the branches often subcircinate. It produces sporogonia more freely than the type and evidently grows in somewhat drier situations. What is apparently

a portion of Hampe's original plant is to be found in Herb. Underwood. All the specimens from the Rocky Mountain region and the Pacific coast that have been referred to *Porella pinnata* belong, so far as we have seen them, to *Porella rivularis*.

2. PORELLA SWARTZIANA (Web.) Trevis. Mem. r. Ist. Lomb.  
III. 4: 407. 1877.

*Jungermannia Swartziana* Web. Prod. 18. 1815.

*Madotheca Swartziana* Lindenb. G. L. N. Syn. Hep. 271. 1845.

Sordid-green or slightly fulvous, dull, opaque: stems procumbent, irregularly pinnate or subbipinnate, 3–5 cm. long; branches obtuse, mostly short: dorsal lobes of leaves subimbricate, circumvolute when dry or spreading, ovate, obtuse, 1–1.7 mm.  $\times$  .7–1.2 mm., entire or slightly repand, inferior margin decurved or subinflexed, occasionally a little undulate-crisped, the leaf-cells with prominent trigones; ventral lobes narrowly falcate or linear-oblong, erect, or commonly with the falcate apex introrse and appressed to the underleaves, flat with plane margins or somewhat concave ventrally, obtuse, rarely acuminate, entire or subrepand above, bearing at the base 1–3 cilia on the inner margin and sometimes a single cilium on the outer, not decurrent, .5–.85 mm.  $\times$  .08–.17 mm., length  $\frac{1}{2}$ – $\frac{2}{3}$  the width of the dorsal; underleaves oblong, erect-appressed, rarely exceeding stem in width, obtuse, truncate, or emarginate-repand, margins plane, entire above, ciliate-dentate at base, subdecurent.

In low ravines, Opelousas, Louisiana (Rev. A. B. Langlois, no. 228 and, in part, no. 529).

The Louisiana plants agree very closely with a West Indian specimen of *P. Swartziana* in Herb. Underwood. Mexican specimens referred to this species differ in several respects. Weber supposed his original (which we have been unable to locate) to have been collected in Jamaica. We have seen no perianths or  $\delta$  branches and these parts are not described by authors.

3. PORELLA WATAUGENSIS (Sulliv.) Underw. in herb.

*Madotheca Porella* var. ? Sulliv. Musc Allegh., no. 265. 1845.

*Madotheca Wataugensis* Sulliv. in A. Gray, Man. Bot. 700.  
1856. [2d ed.]

Similar to *Porella pinnata*, of which it is perhaps a variety—dif-

fering in being smaller and more delicate (dorsal lobes of leaves .85–1.2 mm.  $\times$  .5–.85 mm.), and in the subrepand-dentate margins of dorsal and ventral lobes and underleaves.

EXSICC. Musc. Allegh. 265.

Adhering to decayed logs, bank of the Watauga River, near the base of Grandfather Mt., North Carolina (Sullivant). Collected but once. The ventral lobe often appears to be inserted a little lower upon the stem than the dorsal. The fascicles of rootlets mentioned by Sullivant as a distinguishing character are sometimes better developed in the true *Porella pinnata* than in this.

4. PORELLA RIVULARIS (Nees) Trevis. Mem. r. Ist. Lomb. III. 4 : 407. 1877.

*Madotheca rivularis* Nees, Naturgesch. Eur. Leberm. 3 : 196. 1838.

*Porella dentata* Lindb. Act. Soc. Scien. Fenn. 9 : 342. 1869.

Dull, or very rarely a little polished, opaque, commonly dark green, sometimes yellowish, mostly soft and flaccid: stems irregularly pinnate or subdichotomous, 3–10 cm. long, prostrate or ascending, forming loose or more dense mats, branches somewhat obtuse, scarcely diminishing in width toward apex: dorsal lobes of leaves usually subimbricate or approximate, sometimes distant, rarely closely incubous, obliquely ovate to orbicular-ovate, rounded-obtuse, 1–2 mm.  $\times$  .8–2 mm., entire or subdenticulate, flat or slightly concave beneath, only a little decurved at the apex, trigones mostly small; ventral lobes small, obliquely ovate, acute, .35–.7 mm.  $\times$  .12–.4 mm., length  $\frac{1}{3}$ – $\frac{2}{5}$  the width of the dorsal, about one-half as broad as the underleaves, margins, especially the outer, for the most part broadly revolute, often giving the lobe a twisted appearance, long decurrent, usually dentate or subciliate at base internally and sometimes unindentate externally but scarcely spurred; underleaves distant, quadrate, orbicular to broadly ovate, about twice the width of the stem, apex rounded-obtuse, sometimes reflexed, margins repand-undulate, very long decurrent, the wing sometimes exceeding the free portion in length and usually acutely dentate or subciliate: dioicous:  $\sigma$  spikes oval to oblong, 1.5–2.5 mm. in length;  $\rho$  branch short; ventral lobes of the single pair of bracts acute or subobtuse, entire or repand, the dorsal obtuse, bracteole ovate-linguiform, repand; perianth ovate, with lateral margins deflexed, deeply bilabiate, the lips subentire or repand-dentate, usually plane: spores 27–45  $\mu$ , papillate-echinulate; elaters 180–290  $\mu \times$  8–10  $\mu$ , rather obtuse, 2-(3-) spiral.

Exsicc. Hep. Bor-Am. 91 b.

Hep. Am. 96 (as *Porella platyphylla*), 150 (as *Porella Roellii*, var.).

Can. Hep. 99 (as *Porella dentata*).

On moist rocks, stones in streams, and bases of trees in densely shaded places. Widely distributed and extremely variable according to habitat. Apparently rare in eastern North America, but common on the Pacific Coast. Connecticut (Eaton); Ohio (Sullivan); Texas and New Mexico (Wright); Montana (R. S. Williams); Idaho (Leiberg); British Columbia (Macoun); Alaska (Miss Grace E. Cooley); California (Bolander, Parish, Howe).

Our determination is based upon the drawing (accompanying G. & R. Hep. Eur. no. 371) of the original plant from the bed of the river Bober, near Hirschberg, Silesia, and upon European specimens and the descriptions of authors.

The name *dentata*, applied by Hartman in 1832 (Skand. Fl. 354, 2d ed.) to what he considered a variety of *Jungermannia platyphylla* was taken up for the above species by Lindberg in 1869, but was abandoned by him ten years later without explanations. Hartman's description of his variety *dentata* is quite inadequate for its proper identification and as we have failed in our efforts to see his original specimens, if such exist, we prefer to adhere to the first name which was accompanied by an intelligible diagnosis.

5. PORELLA PLATYPHYLLA (L.) Lindb. Act. Soc. Scien. Fenn. 9: 339. 1869.

*Jungermannia platyphylla* L. Sp. Pl. 2: 1134. 1753.

*Jungermannia platyphylloidea* Schwein. Spec. Fl. Am. Sept. Crypt. 9. 1821.

*Madotheca platyphylla* Dumort. Comm. Bot. III. 1822.

*Madotheca navicularis* Nees, Naturgesch. Eur. Leberm. 3: 176. p. p. 1838.

*Porella thuja* Lindb. Act. Soc. Scien. Fenn. 9: 337. 1869.

Dull or most rarely with a slight lustre, opaque or a little pellucid, yellowish to very dark green, rather rigid: stems somewhat regularly or irregularly 1-3-pinnate, 3-8 cm. long, procumbent,

usually in compact mats, branches obtuse, very rarely subattenuate: dorsal lobes of leaves rather densely imbricate, appressed, or with the superior margin ascending or slightly reflexed, obliquely ovate to obliquely orbicular-ovate, rounded-obtuse, .85–2.1 mm.  $\times$  .65–1.7 mm., apex more or less decurved, superior margin repand-dentate or subentire, the inferior sometimes a little undulate-crisped, cells at inferior basal angle scarcely smaller, trigones distinct; ventral lobes somewhat obliquely ovate to oblong, obtuse, rarely subacute, .4–1.2 mm.  $\times$  .25–.85 mm., length about  $\frac{2}{5}$  the width of the dorsal, nearly equaling underleaves in width or only one half as broad, margins, especially the outer, recurved, entire or with a single acute tooth at base, scarcely decurrent; underleaves approximate or subimbricate, semiorbicular to quadrate-oblong, rounded-obtuse, margins reflexed especially at apex, long-decurrent, sometimes repand or sparingly denticulate at base, otherwise entire: diocious: ♂ spikes oval to oblong, 1.2–3 mm. in length; ♀ branch short; dorsal lobes of bracts obtuse, more rarely acute, the ventral lobes usually acute, margins of both entire or denticulate; perianth oval, inflated ventrally along median line especially when young, narrowed above, the lips denticulate or subciliate, plane, or often lightly revolute, especially toward the lateral margins: capsule oval, light brown, the valves often irregularly split; spores 32–45  $\mu$ , echinulate, elaters 180–250  $\mu$   $\times$  7–10  $\mu$ , 2-(1-) spiral.

Exsicc. Drumm. Musc. Am. (Southern States) 169.

Musc. Allegh. 263.

Hep. Bor-Am. 89, 90, and 91 c (as *Madotheca rivularis* var. ?).

Hep. Am. 29.

Can. Hep. 9.

On tree-trunks, logs, rocks, and soil. Very common in eastern, northern, southern and central North America. Wyoming (Mayhew); Idaho (Leiberg, no. 8, 1888); Vancouver Island, near Victoria (Macoun, May 15, 1893, on young fir trees, no. 29); Ontario (Mrs. Roy, Macoun); Quebec (Faxon); Nova Scotia (ex. herb. James, collector unknown).

Extremely variable. Most of the American specimens belong to *Porella thuja*, as defined by Lindberg, characterized by the somewhat regular pinnate branching, closely appressed obliquely rotund-ovate dorsal lobes, and oblong ventral lobes, the latter nearly or quite as broad as the underleaves. This appears to be

identical with the *Jungermannia platyphylloidea* of Schweinitz, of which we have seen authentic specimens both in his own herbarium preserved at Philadelphia and in that of Torrey at Columbia University. The more common European form of *P. platyphylla*, marked by irregular branching, yellower color, obliquely ovate dorsal tubes with the superior margins ascending or reflexed, and by the obliquely ovate ventral lobes, which are only about half as wide as the underleaves, is rare in America, but as such may be cited specimens collected by Mr. Faxon on Owl's Head, Canada (near Lake Memphremagog), June 27, 1885, and by Professor Underwood at West Goshen, Conn., July, 1887, and at Natural Bridge, Va., Sept., 1887. Transitional conditions occur so frequently that we believe nothing is gained by an attempt at separation.

6. PORELLA NAVICULARIS (Lehm. et Lindenb.) Lindb. Act. Soc. Scien. Fenn. 9: 337. 1869.

*Jungermannia navicularis* Lehm. et Lindenb. in Lehm. Pugill. 6: 38. 1834.

*Madotheca navicularis* Nees, G. L. N. Syn. Hep. 277, p. p. 1845.

Shining or more rarely dull, brownish-yellow, large: stems somewhat regularly bipinnate, 4–12 cm. long, procumbent-caespitose, or subpendulous with apices ascending when moist, branchlets gradually narrowed, subacute, convex on drying and slightly deflexed: dorsal lobes of leaves densely imbricate, appressed, for the most part closely wrapped about the stem when dry, obliquely orbicular-ovate to oblong-ovate, 1.2–2.5 mm. × 1–1.8 mm., rounded-obtuse, apex decurved, subcucullate, inferior margin slightly undulate-crisped, the superior decurrent, its wing sometimes lacinate-crispate, otherwise very entire, the inferior basal angle composed of numerous small thick-walled cells  $\frac{1}{4}$ – $\frac{1}{2}$  the diameter of the remainder, trigones conspicuous throughout; ventral lobes ovate, obtuse, most rarely subacute, regularly rounded outwardly at base, .5–1 mm. × .33–.75 mm., a little smaller than the underleaves, length somewhat more than  $\frac{1}{2}$  the width of the dorsal, margins entire, recurved, decurrent, apex often deflexed; underleaves approximate, quadrate-oblong, rounded-obtuse, margins entire, recurved, long-decurrent, apex occasionally deflexed: dioicous: ♂ branches oval to oblong,  $1\frac{1}{2}$ – $2\frac{1}{2}$  mm. in length;

♀ branch short, lobes of the single pair of bracts minutely denticulate or entire, the ventral usually acute, the dorsal obtuse, bracteole wide; perianth broadly obovate from an obconic somewhat inflated base, scarcely narrowed above, deeply bilabiate, the lips at first subciliate-denticulate, later obsoletely crenulate-dentate or nearly entire, strongly revolute, giving perianth the appearance of being squarely or obliquely truncate: capsule ovoid, yellowish-brown, exerted by about its own length; spores  $50-85\ \mu$ , echinulate, bright yellowish-green; elaters  $275-325\ \mu \times 9-10\ \mu$ , obtuse, 2-(3-) spiral.

Exsicc. Hep. Bor-Am. 91.

Hep. Am. 30.

Can. Hep. 7.

Common on trunks and branches of trees and more rarely on rocks throughout the Pacific Coast from California to Alaska; as far east as Idaho (Leiberg); Mexico (*vide* Gottsche).

The original specimens were collected by Menzies on the western coast of North America, exact locality unknown. The European plants referred by some authors to *Porella navicularis* probably all belong with *P. platyphylla* or *P. laevigata*. This species in a fertile condition can always be very easily distinguished from any simulating form of *P. platyphylla* by the broadly obovate perianth, scarcely narrowed at the mouth, and by the twice larger spores. When sterile, if more obvious characters fail, the numerous, small, thick-walled cells filling the inferior basal wing of the dorsal lobe are of importance; these are  $\frac{1}{4}-\frac{1}{2}$  the diameter of the cells in the middle of the lobe while in *P. platyphylla* the cells are nearly of a uniform size throughout the lobe or slightly smaller at the basal margin.

7. PORELLA ROELLII Steph. Bot. Centralb. 45: 203. 1891.

Green or yellowish-brown, usually shining: stems procumbent, rather flaccid, densely depressed-caespitose, 4-8 cm. long, subdichotomous below, the primary branches for the most part simply and remotely pinnate, branchlets short, often attenuate-deflexed: dorsal lobes of leaves densely imbricate, appressed, obliquely ovate, patent-divergent, .85-1.7 mm.  $\times$  .65-1.5 mm., apex narrowed, subtruncate, obtuse, or most rarely apiculate, inferior margin more or less undulate-crisped, the superior repand, cells at

basal angles slightly smaller, all with evident trigones; ventral lobes ovate, linguiform or ovate-oblong, usually much narrowed toward the obtuse or subacute apex, suberect or patent, scarcely connate with the dorsal, commonly about  $\frac{1}{2}$  as wide as the underleaves, length  $\frac{2}{3}$  the width of the dorsal, somewhat concave ventrally, margins plane or slightly recurved, a little decurrent, very rarely dentate above, more or less strongly spurred at the base, especially at the outer angle, the spur entire or dentate, rarely subciliate; underleaves approximate, ovate-linguiform, rounded-obtuse, the margins recurved, long-decurrent, entire or most rarely subdentate, the wings sometimes crisped: dioicous: ♂ spikes 1–2 mm. long; ♀ branch somewhat elongated, bearing 3–8 leaves (or “bracts”) (usually 2 pairs) nearly similar to the cauline; inmost bracts a little larger, the lobes subacute, entire, repand-dentate, or sparingly denticulate, bracteole ovate, subentire or denticulate; perianth large, somewhat goblet-shaped or broadly obovate, undulate-concave ventrally, here and there inflated, scarcely narrowed or lobed at the wide truncate dentate mouth, the oral margins plane or slightly deflexed at the sides.

EXSICC. Can. Hep. 11 (as *Porella Bolanderi* var.).

Under shelving rocks and on moist shaded cliffs, rarely on tree-trunks. Washington: Kitchelos Lake (Roell, June 12, 1888); Olympia (Henderson, 1892, no. 2594). British Columbia (Macoun): Cascades, Yale (May 1875, also at Yale, May 17, 1889, no. 61); Mt. Benson, Vancouver Island, June 8, 1887; near Victoria (May 12, 1893, no. 7, and May 30, 1893, no. 63). Oregon (Pringle, 1881, no. 502, in part). California (Howe): Mill Valley (no. 1168) and Mt. Tamalpais (no. 1171), Marin Co.; near Cazadero (no. 1170), Sonoma Co.; Ukiah (no. 759) and Navarro (Miss Edith S. Byxbee), Mendocino Co.; Blue Lake (no. 994) and Deer Creek (nos. 1068 and 1073), Humboldt Co.; Hay Fork (no. 1109), Trinity Co.

Type from Kitchelos Lake, Washington (Roell, June 12, 1888)—in Herb. Stephani, Leipsic. Type duplicate in Herb. Underwood.

*Porella Roellii* is closely related to the forms of the European *P. laevigata* with obtuse dorsal lobes and subentire ventral lobes and underleaves, as represented, for example, in Carrington and Pearson's no. 275 Hep. Brit. Exsicc., from Scotland. This is

especially true of British Columbia specimens (Macoun : Cascades, Yale, May, 1875 ; no. 63, near Victoria, May 30, 1893), and of our no. 1068, from California. These latter differ, however, from *P. laevigata* in the smaller, narrower, more pointed, and more strongly calcarate ventral lobes, and in the usually more slender fronds. They are forms like these, we take it, that have been referred by Mr. Pearson \* to *P. laevigata*, but in the predominating forms in Washington, Oregon and California the plant is much less suggestive of *P. laevigata*, and we prefer to maintain Stephani's species, and to associate with it the British Columbia specimens alluded to and our no. 1068, even though, as must be admitted, they make a near approach to certain conditions of the European plant. Perianths occur only on our no. 994 from Blue Lake, Humboldt Co., California. We have been unable to compare the perianths of *Porella laevigata*, inasmuch as these organs are uniformly wanting in the somewhat extended series of European specimens that we have been privileged to examine, but the perianth of *P. laevigata* is described by Nees † as ovate, inflated, and truncate-bi-trilobed, while in *P. Roellii* the perianth is broadly obovate or goblet-shaped, and scarcely lobed at the wide truncate mouth.

No. 150, Hep. Am. (issued as *Porella Roellii*, var.) belongs with *P. rivularis*, as is evidenced by the form of the ventral lobes and underleaves, the short ♀ branches, the characters of the perianth, etc.

Professor Macoun's specimen from Yale, British Columbia, May, 1875, was labeled "*Madotheca Macounii* n. sp." and "*M. laevigata*, var. *integrifolia*," by Austin *in herb.*

8. PORELLA BOLANDERI (Aust.) Pearson, List. Can. Hep. 7. 1890.  
[excluding specimens cited (?)]

*Madotheca Bolanderi* Aust. Bull. Torr. Bot. Club, 3 : 14. 1872.

Dark- or yellowish-green, dull : stems 1½–6 cm. long, subsimple or with a few somewhat fasciculately disposed obtuse tumid branches, often subpendulous, more or less vaulted or flexuous when dry : dorsal lobes of leaves densely imbricate, appressed or subsquarrose, dimidiate-ovate to oblong, 1.5–2.9 mm. × .67–1.8 mm., sometimes considerably narrowed toward the obtuse apex,

\* List of Canadian Hepaticae, 7. 1890.

† Naturgesch. Eur. Leberm. 3 : 165. 1838.

slightly decurved when moist, circumvolute-deflexed in drying, rather distinctly margined by somewhat inflated subrectangular cells, the inferior margin more or less undulate, often narrowly inflexed, the superior repand or here and there caudate-dentate, the base long drawn out and projecting beyond the stem, trigones small; ventral lobes and underleaves approximate or more often imbricate, sometimes entirely concealing the stem; ventral lobes ovate-lanceolate to linear-lanceolate, rarely almost subulate, acute or occasionally somewhat obtuse, subfalcate, canaliculate, slightly twisted, long-decurrent, nearly discrete, .4–1 mm.  $\times$  .08–.4 mm., about  $\frac{1}{2}$  as wide as the underleaves, length  $\frac{2}{5}$ – $\frac{3}{5}$  the width of the dorsal, undulate-repand above, sparingly caudate-lacinulate on inner side at base, often also on the outer; underleaves ovate-lingulate to oblong, a little wider than the stem, apex obtuse, subacute, rarely emarginate or slightly cleft, often deflexed, margins plane or recurved, undulate-repand, long-decurrent, the wings with commonly 2 or 3 cauda-like laciniae on either side toward the base: dioicous: ♂ spikes oblong to almost linear, 2–4 mm. in length; ♀ branch short; dorsal lobes of bracts subobtuse or acute, the ventral acute or often subulate-pointed, margins of both subentire or denticulate above, ciliate-caudate at base, bracteole large, ovate, usually acute, denticulate above, caudate-lacinulate below; underleaf subtending ♀ branch acutely emarginate or bifid; perianth broadly ovate from a shortly obconic base, somewhat compressed, lightly undulate-plicate dorsally, often furnished ventrally with 2 or three rarely winged carinae, narrowed at the ciliate, subtruncate, deeply bilabiate mouth: capsule oval or oval-oblong, exserted by about its own length; spores 29–40  $\mu$ , minutely echinulate; elaters 180–310  $\mu \times$  10–12  $\mu$ , 2-(3-) spiral.

EXSICC. Hep. Am. 31.

On stones, under shelving rocks, and on the bark of living trees, especially of *Quercus agrifolia*. California, apparently throughout the state (Bolander, Underwood, McClatchie, Howe).

Type in Herb. Pearson, Knutsford, Cheshire, England. We have seen no specimens of *Porella Bolanderi* from any station outside of California. Can. Hep. no. 10 (distributed as *P. Bolanderi*) is, so far as we have seen it, *Porella rivularis*—in one pocket mixed with *P. navicularis*. Can. Hep. no. 11 (issued as *Porella Bolanderi* var.), from Mt. Benson, Vancouver Island, is *Porella Roellii* Stephani.

In moist, densely shaded places, *Porella Bolanderi* assumes a more lax, flaccid habit, resembling certain forms of *P. rivularis*.

Such conditions, however, when the characteristic ciliate perianths are wanting, can usually be distinguished from any state of *P. rivularis* by the more oblong, more distinctly marginate, dorsal leaf-lobes, and by the longer and narrower ventral lobes and underleaves, which are more pronouncedly caudate at the base.

The above revision is based, outside of our own collections in California, chiefly upon the rich representation of this genus in the herbarium of Professor Underwood, and upon the specimens in the herbarium of Columbia University. We further gratefully acknowledge our indebtedness to the Philadelphia Academy of Sciences, for the loan of the Schweinitz collection; to Dr. A. W. Evans for the privilege of examining specimens in his own herbarium and that of Yale University, and to W. H. Pearson, Esq., of Knutsford, Cheshire, England, for the loan of the type of *Porella Bolanderi*.

COLUMBIA UNIVERSITY, DEPARTMENT OF BOTANY,

November 13, 1897.

### A new Species of Wild Ginger hitherto confounded with *Asarum Canadense* L.

BY EUGENE P. BICKNELL.

(PLATES 316, 317.)

It has certainly much significance in its bearing on the study of our common flora that a plant so noteworthy as the familiar wild ginger, and supposedly so well understood, should now reveal itself as embracing two perfectly distinct species. Both plants are common and widely distributed, but they are so much alike in general appearance that it is scarcely a matter of surprise that they have held their secret so long. Agreeing in main features throughout, they share the same general form of rootstock, leaf and flower, are similar in habit of growth, and bloom at the same time. The differences between them are, in fact, no greater than might fairly measure the variation of a single species, and that they are of higher import has been learned only by careful field study continued through several seasons.